

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE STANDARD**  
**MULCHING**

(Ac.)

**CODE 484**

**DEFINITION**

Applying plant residues, by-products or other suitable materials produced off site, to the land surface.

**PURPOSE**

- Conserve soil moisture
- Moderate soil temperature
- Provide erosion control
- Suppress weed growth
- Establish vegetative cover
- Improve soil condition and increase soil fertility

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all lands where mulches are needed. This practice may be used alone or in combination with other practices.

**CRITERIA**

**General Criteria Applicable To All Purposes**

The selection of mulching materials will depend primarily on site conditions and the material's availability and expense. Mulch materials shall consist of natural and/or artificial materials such as plant residue, wood bark or chips, gravel, plastic, fabric, and animal manure of sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

Mulching is generally performed after grading, soil surface preparation and seeding or plantings are complete. Mulch should be applied in a way that will not shade, or interfere

with plant growth. Soil surface shall be prepared in order to achieve the desired purpose.

The mulch material shall be evenly applied and anchored to the soil as needed. Tackifiers, emulsions, pinning, netting, crimping or other acceptable methods of anchoring will be used if needed to hold the mulch in place for specified periods. Most organic mulches will decompose within a season and may be incorporated into the soil or replenished the next season if needed.

The application of some mulch materials may not allow for good air and water penetration creating water logged soils or cool soil temperatures. Mulch installation may need to be delayed if these conditions exist.

Manufactured mulches shall be applied according to the manufacturer's specifications.

Mulching operations shall comply with federal, state and/or local laws and regulations during the installation, operation and maintenance of this practice.

Mulch material shall be free of disease, noxious weed seeds, viable seed, and other pests and pathogens. Some organic mulch may require composting or drying before application to destroy viable seed.

**Additional Criteria To Conserve Soil Moisture**

Mulch materials applied to the soil surface shall provide at least 60 percent cover to reduce potential evaporation.

Mulch material shall be applied prior to moisture loss. Prior to mulching, ensure soil under shallow rooted crops is moist, as these crops require a constant supply of moisture.

See **Table 1** for mulching characteristics.

#### **Additional Criteria To Moderate Soil Temperature**

Mulch materials shall be selected and applied to obtain 100 percent coverage over the area treated. The material shall be of a significant thickness to persist for the period required for the temperature modification.

See **Table 1** for mulching characteristics.

#### **Additional Criteria To Provide Erosion Control**

Mulch material should be distributed evenly over the site and protected from disturbance. Most of the mulches in **Table 1** will provide adequate erosion protection on slopes less than 3%. They may require anchoring materials to hold in place on steeper slopes. Hay mulches on stronger sloping sites can be anchored to the soil by disking or any other appropriate method.

See **Table 1** for mulching characteristics.

#### **Additional Criteria To Suppress Weed Growth**

The thickness of mulch will be determined by the size of the plant being mulched. Small plants must not be smothered. Mulches shall be kept clear of the stems of plants where disease is likely to occur. Mulches applied around growing plants or prior to weed seedling development shall have 100 percent ground cover. Thickness of the mulch shall be adequate to prevent emergence of targeted weeds.

See **Table 1** for mulching characteristics.

#### **Additional Criteria To Establish Vegetative Cover**

Hay mulch material may be used to establish vegetation when other methods of providing cover are inadequate.

Hay mulch shall be applied at a rate that achieves approximately a 50 percent ground cover to provide protection from erosion and runoff and yet allow adequate light and air penetration to the seedbed to ensure proper germination, emergence, and disease suppression.

Hay mulches of native prairie grass, weeping lovegrass, yellow bluestems, tall fescue, and sorghum shall be used on sites where the area will not have a permanent cover of vegetation for at least 6 months. Straw from small grains may be used on sites that need protection for 3 months or less.

Hay mulches shall be distributed evenly over the area needing protection at a minimum rate of 2.5 tons/ac (1 lb/sq. yd.). Mulch should be applied after the seeding operation unless needed to protect the area prior to seeding. When hay mulch is used on areas with the potential to be removed from the site by wind or water, it should be anchored with the soil by disking or other appropriate methods. Protect mulched areas from disturbance.

#### **Additional Criteria To Improve Soil Condition And Increase Soil Fertility**

To improve soil fertility, apply mulch materials with a carbon to nitrogen ratio (C:N) less than 30 to 1 such as animal manure or legume forage hay. Other practices such as contouring filter strips or riparian forest buffers may be needed to assure that runoff from the mulched areas will not transport mulching materials to sensitive waterbodies. Do not apply mulch with a C:N less than 20:1 to the area of designed flow in watercourses.

The Soil Conditioning Index (SCI) will be used to determine the amount of biomass required to maintain or improve soil condition. The SCI must be 0 (zero) or better (positive).

#### **Saline or Alkali Soils**

Soils with saline or alkali problems generally have very poor surface moisture infiltration. Large amounts of organic material incorporated into the top 4 to 6 inches of soil creates pore space for water to enter and reduces the wick-like capillary movement to the surface that occurs during dry periods. Soils with saline or alkali problems require additional management. Follow the guidance in the Toxic Salt Reduction (610) standard and specification for total treatment of these soil conditions.

Hay from native prairie grass, weeping lovegrass, yellow bluestems, tall fescue, sorghum, small grains, or barnyard manure applied at a rate of 15 to 20 tons/ac. shall be used for organic material.

Land applications of sewage sludge (biosolids) may be used for organic material. Dry weight of the biosolids, pound for pound, will be comparable to the grass mulches. Land application rates and locations for biosolids must be developed by the Oklahoma Department of Environmental Quality. A hay mulch of 2.5 tons/ac will be applied to the soil surface after sewage sludge application and seeding or planting of the area.

## CONSIDERATIONS

Consider the effects of mulching on evaporation, infiltration and runoff. Mulch material may affect microbial activity in the soil surface, increase infiltration, and decrease runoff, erosion and evaporation. Increased infiltration may increase nutrient and chemical transport below the root zone. The temperature of the surface runoff may also be lowered.

Mulched soil retains moisture, requires less watering and reduces the chance of water stress on plant materials. Mulch also minimizes evaporation from the soil surface and hence reduces losses from bare soil areas.

Mulch materials high in organic matter with a high water holding capacity and high impermeability to water droplets may adversely affect the water needs of plants.

Consider potential toxic allopathic effects that mulch material may have on other organisms. Animal and plant pest species may be incompatible with the site.

Consider the potential for increased pathogenic activity within the applied mulch material.

Deep mulch provides nesting habitat for ground-burrowing rodents that can chew extensively on bark on tree trunk and/or tree roots. Light mulch applied after the first cold weather may prevent rodents from nesting.

Additional fertilizer may be needed to help breakdown organic materials.

## PLANS AND SPECIFICATIONS

Specifications shall be prepared for each site and purpose and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation

plan, or other acceptable documentation. Documentation shall include:

- Type of mulch material used
- Percent cover and/or thickness of mulch material
- Timing of application
- Site preparation
- Listing of netting, tackifiers, or method of anchoring, and
- Operation and maintenance.

## OPERATION AND MAINTENANCE

Mulched areas will be periodically inspected, and mulch shall be reinstalled or repaired as needed to accomplish the intended purpose.

Removal, incorporation, bio- or photo-degradation of mulch and associated materials shall be consistent with the intended purpose and site conditions.

Operation of equipment near and on the site shall not compromise the intended purpose of the mulch.

Prevent or repair any fire damage to the mulch material.

Properly collect and dispose of artificial mulch material after intended use.

Monitor and control undesirable weeds in mulched areas.

## REFERENCES

Agriculture and Agri-Food Canada. 2000. Plastic Mulches for Commercial Vegetable Production. Canada-Saskatchewan Irrigation Diversification Centre. Outlook, Saskatchewan.

Natural Resources Conservation Service. 2002. National Agronomy Manual 190-V. USDA-NRCS. Washington, D.C.

Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder. 1997. Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook No. 703. Pp. 175,177-179.

Shaffer, M.J., and W.D. Larson. 1987. NTQM, A Soil-Crop Simulation Model for Nitrogen, Tillage, and Crop Residue Management. U.S. Department of Agriculture, Agricultural Research Service. Conservation Research Report 34-1. Pp. 83.

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Wischmeier, W.H., and D.D. Smith. 1978. Predicting Rainfall Erosion Losses-A guide to Conservation Planning. U.S. Department of Agriculture, Agriculture Handbook No 537. Pp. 19, 26, 31, 50.

Wischmeier, W.H. 1974. New Developments in Estimating Water Erosion. In: Proceedings of the 29<sup>th</sup> Annual Meeting of the Soil Conservation Society of America. Syracuse, New York.

OSU Fact Sheet F-6005, "Mulching Garden Soils"

**TABLE 1**

Mulch Material	Thickness of Application	Mulch Uses					Comments
		Conserves Soil Moisture	Moderates Soil Temperature	Erosion Control	Suppress Weeds	Improves Soil Fertility	
Peat Moss	1 inch	Poor forms crust, repels water, draws moisture from soil	Fair – Poor dries out easily, must be keep damp	Poor forms crust, can be washed and blown away	Fair - Good	Poor decomposes slowly, adds very little nutrients to the soil.	Expensive, value is in conditioning the soil
Sawdust* (partially rotted or decomposed)	1 – 2 inches	Fair can crust preventing water penetration	Good when kept moist	Poor – Fair can wash away	Good	Poor very high C:N ratio.	Best used for garden paths and around permanent plantings. Fresh saw dust can crust. Black Walnut bark and wood are very toxic to many plants
Cotton Hulls*	1 - 2 inches	Good	Good	Fair wind and water can remove	Good	Good	
Compost	1 - 3 inches	Good	Good	Poor - Fair can be washed away	Good when applied in thick layer	Good	May be expensive
Lawn Clippings (dry clippings)	1 – 3 inches	Fair - Good can compact and seal preventing water from penetrating	Good	Poor – Fair can be removed by water	Fair - Good	Fair - Good	Green grass clippings will produce heat and odors, may contain viable seed
Pine Needles (shred before incorporating)	4 – 8 inches	Fair - Good	Fair - Good	Fair - Good	Fair - Good	Poor - Fair	Good for acid-soil plants, long lasting

**TABLE 1** (continued)

Mulch Material	Thickness of Application	Mulch Uses					Comments
		Conserves Soil Moisture	Moderates Soil Temperature	Erosion Control	Suppress Weeds	Improves Soil Fertility	
Straw, Hay* (not chopped)	4 – 8 inches (2.5 T/ac)	Good	Good	Good may need to be mixed with soil to anchor	Good	Fair - Good	Decomposes and must be replenished periodically to control weeds, may contain many weed seed
Leaves* (shredded and partially decomposed)	4 – 8 inches	Good	Good	Fair may need to be lightly mixed with soil to anchor	Fair - Good	Fair – Good	
Bark and Wood Chips, Wood Shavings*	2 - 3 inches	Good water and air movement good	Good	Fair can be removed by runoff	Good	Poor	Decomposes slowly, well for permanent plantings. Black Walnut bark and wood are very toxic to many plants
Shredded Newspaper (wet to keep in place)	4 – 8 inches	Fair – Good water penetration is fair, dries out quickly	Fair - Good when kept moist	Fair wind and water can remove	Good	Poor	Good to use between garden rows, better when covered with other organic mulches
Manure (Partially decomposed)	1 - 2 inches	Good	Good	Poor - Fair can be removed by water	Fair	Good	May contain weed seed, can burn tender roots on vegetable and other ornamental plants

**TABLE 1** (continued)

Mulch Material	Thickness of Application	Mulch Uses					Comments
		Conserves Soil Moisture	Moderates Soil Temperature	Erosion Control	Suppress Weeds	Improves Soil Fertility	
Landscape Fabric (Weed Barriers)	1 layer	Good	Good	Fair to Good when anchored to the soil	Fair to Good weeds may germinate on top of fabric	Poor	Can be covered with desired mulch, decomposes very slowly
Black Plastic	1 layer	Good conserves moisture but will not allow water to penetrate, may create extreme conditions from water logging soil to drying soil out	Good warms soil	Good when anchored to the soil	Good	Poor	Labor intensive, expensive, does not decompose, adds nothing to the soil
Pea Gravel	2 inches	Fair	Good generally warms soil	Fair	Fair	Poor	Expensive, labor intensive, permanent mulch

\*Mix one pound of actual nitrogen per 50 lbs. of dry material to provide for decomposition.